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Ambient and Indoor Sampling and Public Health Evaluations for Residential Areas Near WTC

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I. Introduction:

This sampling protocol was developed to assess potential exposures to airborne and settled surface dust that entered residential areas following the collapse of the World Trade Center (WTC) buildings. The collapse of the WTC buildings resulted in a large number of residents being evacuated from their homes. Since the collapse, some residents have not reoccupied their apartments/homes near the WTC. Others have either visited to assess damage or to clean. Many have reoccupied their homes, and it is anticipated that more residents will soon be moving back. To date, environmental sampling efforts have focused on rescue/recovery areas (occupational); some sampling of commercial buildings to ensure office worker safety; and ambient (outdoor) air sampling for asbestos in a number of residential/commercial areas. Additional sampling is needed to ensure that residential areas are not adversely impacted by WTC collapse-related materials—both inside and outside of their residences.

Surface dust and debris containing asbestos have been found in lower Manhattan. Asbestos has been detected in personal air samples of “hot-zone” workers. In addition, low levels of asbestos have been detected in air samples collected on the “hot-zone” perimeter. Crystalline silica quartz has been detected in some of the 30 settled dust samples collected by NIOSH. Although most samples contained less than 5%, some samples contained from 15-20% crystalline silica quartz. Of the twelve personal air samples from the work site that have been analyzed for respirable crystalline silica, no detectable levels were found.

Dust, bulk, and air samples (mostly on or near the work site), as well as surface runoff water, river sediment, and river water have been analyzed for other contaminants, including metals, volatile organic compounds (VOCs), PAHs, dioxins and PCBs. The low levels of these contaminants that have been found do not indicate an immediate need to conduct widespread environmental testing for them.

Materials in airborne dust that may be of more immediate health concern—especially to residents who are returning to lower Manhattan—are those that can cause eye, nose, and throat irritation. Materials that can be inhaled or respired from airborne dust may cause respiratory irritation and exacerbation of pre-existing problems such as asthma, emphysema, and cardiopulmonary disease. Analysis of WTC-related residential surface and airborne dust, both indoors and outdoors, is to 1) determine if residents are being exposed to concentrations of materials that may be of public health concern; 2) whether areas already cleaned (inside and outside environments) contain materials that may be of public health concern; and 3) provide information to the public.

Information from residents support the need to further assess potential indoor and outdoor

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environmental health issues. Burning throats have been reported to be a common problem in the recently re-occupied residential areas. Residents in south Battery Park City, whose windows were open at the time of the WTC collapse, have settled dust in their homes. Some have disposed of furniture, stereo equipment, etc., because they were covered with "ash and dust." Homes in the Tribeca zone (Chambers Street to Murray Street, west of Broadway) are not yet occupied, but were reported to have roofs covered with hand-sized chunks of insulation-like material that contain small pieces of mica-like material. In addition, the mica-like material has clogged roof drains and resulted in standing pools of water on residential roof tops.

II. Sampling Objective:

The **overall objective** of this sampling is to provide results upon which public health agencies can further determine the potential for environmental exposures to WTC collapse-related materials and possible health implications of the exposures. Sampling will characterize ambient and indoor airborne and potentially airborne particles (surface dust) that remain in residential areas and commercial areas of lower Manhattan from the collapse of the World Trade Center. Specifically, the objective is:

Characterize the make-up and size distribution of settled dust and airborne breathing zone dust in residential areas—both indoors and outside—near the WTC. This information will be used to further determine if materials are present in air at levels of public health concern; and if materials are present in settled surface dust that can be re-entrained and result in continued exposures.

Sample locations will be selected in a concentric circle pattern, starting close to the WTC and ending in neighboring boroughs. Section V, Residence Selection/Sampling rationale, of this protocol describes this approach.

III. Data and Quality Assurance:

Co-located samples will be collected in 10% of the air samples. While not a true duplicate, evaluation of the results will provide some information on the quality of the sampling technique. Generally, analysis of duplicate samples should be within +/- 20% of each other.

At least two field blanks (or 10% of samples submitted, whichever is greater) per sample location will be submitted with the air samples. Blank cassettes should be opened at the same time as the sample cassettes are opened (just prior to sampling). Blank cassettes and their covers should be stored in a clean area (e.g., closed bag or box) with the covers from the sampling cassettes during the sampling period.

Each air sampling pump will be calibrated with a representative sampling device in-line before and after sample collection. Sample flow rates will be documented in the sampling log. The

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average of pre- and post-calibration flow rates will be used as the sample flow rate, for sample volume calculations.

Dust samples will be collected using the EPA Environmental Response Team (ERT) indoor dust sampling standard operating procedure (SOP). Duplicate samples are not feasible with indoor surface dust sample collection. Co-located samples (samples collected from adjacent areas of the floor) will be collected in 10% of the indoor surface dust sample locations. While not a true duplicate, evaluation of the results will provide some information on the variability of contaminants in the dust.

Chain of custody will be established and maintained throughout sample collection, transport, and analysis of the samples. Laboratory analysis shall follow all method-required quality assurance and quality control procedures.

All samples collected, unless analyzed with destructive methods, will be archived until further notice.

Samples should not be packaged in untreated polystyrene—electrostatic forces may cause fiber loss from some sample filters.

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V. Residence Selection/Sampling Rationale

The selection of residential sampling locations will be decided upon by NYC DOH. The general NYCDOH approach is described as follows: A total of approximately 60 residential units will be sampled (a **unit** is an individual apartment or a common area in a multi-apartment building). A series of three concentric circles is being drawn around the WTC location. These circles will be divided by direction or zone from the WTC (north, south and west, and east). From five to seven of the multi-residential buildings will be selected for testing from within each zone.

Testing locations will mainly focused on occupied residences. However, approximately five unoccupied units nearest the WTC will be targeted for testing. In addition, approximately ten units will be selected outside of the concentric circles, in neighboring boroughs, to serve as background sample locations.

Sampling personnel will document the rationale for selecting buildings and residential units for sampling. They will also document sample locations, conditions during sampling, and possible interfering factors (e.g., traffic, construction). In addition, unit occupants and building owner/operators will be requested to provide information that will better assist in evaluating the results. Section IX of this plan contains the information needed/requested.

It should be noted that types of contaminant/materials and their concentrations may vary as the distance of the residence from the WTC. increases

All samples collected, unless analyzed using destructive methods, will be archived until further notice.

VI. Sampling/Analysis Approach:

1. Interior

Air and dust sampling will focus on both common/high traffic areas of the building (e.g., lobbies, front entryways) and on a selected number of apartments/units in the building. Attempts will be made to select apartments/units where dust is visible as well as units where dust is not visible. Selecting entryways and common areas should be representative of worst case conditions for contaminant/material track-in from outdoors. Selecting several apartments/units in the same building—with and without visible dust—should provide information on the ranges of contaminants found in indoor living spaces.

If the building is unoccupied, aggressive (leaf blower, high-power fan) indoor air sampling should be conducted. If the building is occupied, air sampling should be conducted with the building/unit HVAC system's fan in continuous operation. After sampling is completed, filters for the HVAC system, if applicable, should be inspected. If dust is present, recommend filter replacement.

Indoor air sampling for asbestos will be conducted and analyzed using NIOSH method 7400. If an action level is exceeded subsequent filter analysis using NIOSH 7402 to determine if the

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fibers present are asbestos will be conducted. Respirable crystalline silica will be sampled and analyzed using NIOSH method 7500. Air sampling for inhalable, thoracic, and respirable size particles will be conducted using the IOMTM sampler. The relative amounts (percent weight) of each fraction present will be determined. Each fraction will be analyzed for silica, gypsum, mica, fiberglass, and calcite using X-ray diffraction (XRD) analysis, and for asbestos using PLM analysis (and TEM analysis if PLM indicates <1%).

Indoor floor dust samples will be collected using EPA ERT SOP for household dust collection. As much dust as possible will be collected; the area vacuumed will be measured and reported. Samples will be analyzed for crystalline silica, gypsum, mica, fiberglass and calcite using XRD. Asbestos will be analyzed using PLM; if <1% if found, TEM analysis will be conducted. The pH of the dust will be tested using EPA SW846 Method 9045C.

2. Exterior

Outdoor air and settled dust sampling will occur in areas adjacent to the residential building being tested indoors. Sampling will occur concurrently with indoor sampling.

Ambient air sampling will be conducted at breathing height. Air sampling for asbestos will be conducted and analyzed using NIOSH method 7400. If an action level is exceeded subsequent filter analysis using NIOSH 7402 to determine the amount of asbestos fibers present will be conducted. Respirable crystalline silica will be sampled and analyzed using NIOSH method 7500. Air sampling for inhalable, thoracic, and respirable size particles will be conducted using the IOMTM sampler. The relative amounts (percent weight) of each fraction present will be determined. Each fraction will be analyzed for silica, gypsum, mica, fiberglass, and calcite using X-ray diffraction (XRD) analysis, and for asbestos using PLM analysis (and TEM analysis if PLM indicates <1%). Twelve-hour, continuous, real-time TSP, PM10 and PM 2.5 sampling will be conducted—again at breathing zone height.

Settled surface dust samples will be collected by scraping visible dust into a glass container. A minimum of 25-30 grams of sample is required. Samples will be analyzed for crystalline silica, gypsum, mica, fiberglass and calcite using XRD, and for asbestos using PLM analysis (and TEM analysis if PLM indicates <1%). The pH of the dust will be tested using EPA SW846 Method 9045C.

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VII. Screening Levels/Data Interpretation:

Screening levels and actions are outlined in Section XI of this proposal.

Data will be evaluated by local, state and federal public health agencies. Evaluations will include:

- 1) Indoor sample results will be evaluated on a residence-by- residence basis (for the individual occupants)
- 2) All indoor data will be evaluated to determine the extent of public health implications for residents near the WTC
- 3) All outdoor data will be evaluated to determine the extent of public health implications for the general public living near the WTC
- 4) The relationship between materials found in indoor and outdoor samples will be evaluated.

If results of testing show contamination/materials present at levels of concern, efforts should be made to reduce these levels and to take steps that eliminate transporting them indoors (e.g., reduce contaminant track in by removing or changing shoes prior to entering residence, use HEPA filters on HVAC systems, keep windows closed).

VIII. Interference from existing bldg materials:

It is anticipated that some of the contaminants/materials found in this sampling effort will be unrelated to the WTC event. Attempts will be made during sample collection to note other possible sources of contaminants (Section IX, Sample Description Needs).

To better determine if contaminants/materials found are within area background levels, approximately ten residential units outside of the concentric circle zones will be selected testing (indoor air and surface dust, outdoor air and surface dust).